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IS 11469 (1985): Method for assessing chemical resistance of enamels used for colour coding and colour marking [CHD 10: Glassware]



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Indian Standard

METHODS FOR ASSESSING THE CHEMICAL RESISTANCE OF ENAMELS USED FOR COLOUR CODING AND COLOUR MARKING

UDC 621-777.6 : 666.293 : 620.193.4 : 543.231 : 661.172.7



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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Indian Standard

METHODS FOR ASSESSING THE CHEMICAL RESISTANCE OF ENAMELS USED FOR COLOUR CODING AND COLOUR MARKING

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(Continued on page 2)

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(Continued from page 1)

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Indian Standard

METHODS FOR ASSESSING THE CHEMICAL RESISTANCE OF ENAMELS USED FOR COLOUR CODING AND COLOUR MARKING

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 October 1985, after the draft finalized by the Laboratoryware and Related Apparatus Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard covers the methods of test which are intended to give an assessment of the chemical resistance of colour marking enamels used on laboratory glassware colour coded according to IS : 11468-1985*. Detergent and acid solutions have been chosen to represent the most severe conditions to be encountered in practice.

0.3 In the formulation of this standard considerable assistance has been taken from ISO 4794-1982 'Laboratory glassware methods for chemical resistance of enamels used for colour coding and colour marking', issued by the International Organization for Standardization (ISO), Geneva.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960†.

1. SCOPE

1.1 This standard specifies test methods for the assessment of the service performance of enamels used for colour coding and colour marking of laboratory glassware. It does not purport to classify enamels by their degree of resistance; it provides standard procedures for determining whether an enamel resists the specified treatment without a change such that the colour can no longer be identified, or might be confused with any other colour used in colour coding.

*Specification for colour coding for pipette.

†Rules for rounding off numerical values (revised).

1.1.1 The procedures involve treatment for specified periods with an alkaline detergent solution at 80°C and a dilute acid solution at room temperature.

2. PREPARATION OF TEST PIECES

2.1 Cut test pieces from the laboratory glassware so as to include the complete colour marking enamel to be assessed plus at least 5 mm of the adjacent parts of the glassware. Wash each test piece three times in separate portions of the cold water and wipe with the cleaning cloth, then wash three times in separate portions of the cold acetone. Finally, wipe the test pieces with the cleaning cloth to remove all traces of soiling, and transfer them to a stoppered storage vessel, unless proceed immediately with testing.

3. METHODS

3.1 Resistance to Detergent Solutions

3.1.1 Reagents

3.1.1.1 Detergent solution — Dissolve 50 g of tetrasodium pyrophosphate ($\text{Na}_4\text{P}_2\text{O}_7$) and 5 g of sodium dodecylbenzene sulphonate ($\text{C}_{18}\text{H}_{29}\text{SO}_3\text{Na}$) in 1 litre of water

3.1.1.2 Acetone — See IS : 170-1976*.

3.1.2 Apparatus

3.1.2.1 Beaker — One-litre capacity (see IS : 2619-1971†).

3.1.2.2 Beaker cover glass — Having diameter sufficient to cover the 1 litre beaker.

3.1.2.3 Heating bath — Having suitable heating equipment which enables a test solution to be maintained at a constant temperature of $80 \pm 1^\circ\text{C}$.

3.1.2.4 Thermometer — 0 to 100°C capable of measuring to $\pm 1^\circ\text{C}$. [see IS : 2480 (Part 1)-1983‡].

3.1.2.5 Cleaning cloth — Made of pure cellulose.

3.1.2.6 Sample holder — Made from inert material.

*Specification for acetone (second revision).

†Specification for glass beakers (first revision).

‡Specification for general purpose glass thermometer: Part 1 Solid stem thermometers (second revision).

3.1.3 Procedure

3.1.3.1 Heat 700 ml of the detergent solution to $80 \pm 1^\circ\text{C}$ in the beaker using the heating bath. Suspend not more than 10 test pieces, with the aid of the sample holder, in the hot test solution, so that the test pieces are freely in contact with the solution on all sides. Cover the beaker with the beaker cover glass.

Maintain the temperature of the test solution at $80 \pm 1^\circ\text{C}$ for 120 ± 5 min from the time of immersion.

After this period, remove the test pieces from the solution, wash them thoroughly with the water, wipe with the cleaning cloth and then rinse three times in fresh portions of the acetone. Allow to drain dry.

3.2 Resistance to Acid Solutions

3.2.1 Reagents

3.2.1.1 Hydrochloric acid — 2 N.

3.2.1.2 Acetone — See IS : 170-1976*.

3.2.2 Apparatus

3.2.2.1 Beaker — One-litre capacity (see IS : 2619-1971†).

3.2.2.2 Sample holder — Made from inert material.

3.2.2.3 Cleaning cloth — Made of pure calculose.

3.2.3 Procedure

3.2.3.1 Transfer about 700 ml of the cold hydrochloric acid to the clean beaker and allow to stand until it reaches room temperature.

Suspend not more than 10 test pieces, with the aid of the sample holder in the hydrochloric acid so that the test pieces are freely in contact with the acid on all sides, and cover with the beaker cover glass. Allow to stand for 60 ± 5 min at room temperature.

After this period, remove the test pieces from the acid, wash them thoroughly with water, wipe with the cleaning cloth and then rinse three times in fresh portions of acetone. Allow to drain dry.

4. INTERPRETATION OF RESULTS

4.1 At the end of each test, compare the colour of the enamel on each of the test pieces with that of a similar test piece which has been prepared in accordance with 2 and then store without further treatment.

*Specification for acetone (second revision).

†Specification for glass beakers (first revision).

Disregard any loss of gloss in the treatment test pieces, but note any change or loss of colour such as might lead to the loss of colour marking or to confusion with any other colour used in colour coding.

4.2 Resistance to Detergent Solutions

4.2.1 A colour coding enamel, when prepared in accordance with 2 and tested as specified in 3.1, is regarded as passing the test, if it does not change in colour, with or without loss of gloss, to the extent that its identity is lost or that it can be confused with any other colour used for colour coding.

4.3 Resistance to Acid Solutions

4.3.1 A colour coding enamel, when prepared in accordance with 2 and tested as specified in 3.2, is regarded as passing the test if it does not change in colour, with or without loss of gloss, to the extent that its identity is lost or that it can be confused with any other colour used for colour coding.

4.4 Conditions for Re-test

4.4.1 If in either test for the resistance to detergent solutions or the test for resistance to acid solutions, any of the test pieces has changed colour to an unacceptable extent, then test shall be repeated with a fresh sample of the colour which failed. No failures on re-test are permitted.

5. TEST REPORT

5.1 The following minimum information shall be given in test report:

- a) Size and description of the batch or consignment of laboratory glassware from which the sample was taken;
- b) Colour of the enamels tested;
- c) Number of test pieces used;
- d) Results of test for resistance to detergent solutions and of test for resistance to acid solutions;
- e) Whether re-test was necessary in test for resistance to detergent solutions or in test for resistance to acid solutions; and
- f) Date of test.